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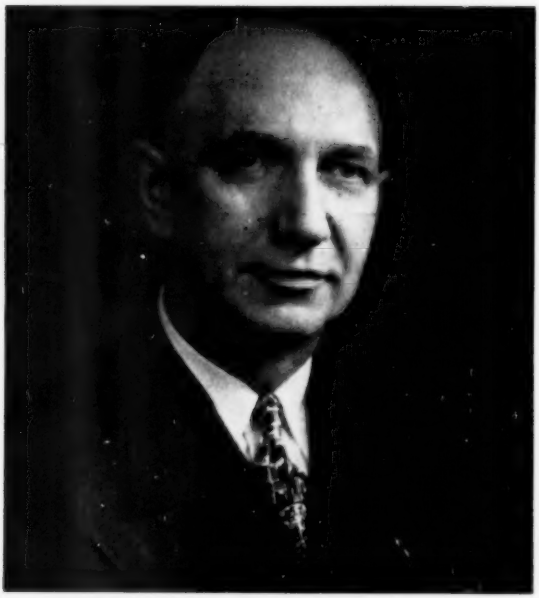

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OUR COVER

THE Remington Medalist for 1952, Dr. Patrick H. Costello, is indeed well chosen to join that distinguished company of those who have received Pharmacy's highest honor over the years.

"Pat", as so many thousands know him, hardly needs a listing of his accomplishments or his activities in pharmacy for there is scarcely a group, large or small, that has not had him address their members, heard him discuss their mutual problems and give tactful, sound advice concerning their solution.

Dr. Costello is best known for the indefatigable effort which he has expended over the years as Secretary of the National Association of Boards of Pharmacy. Few people realize the task which this responsibility involves and were it not for the efficient direction and leadership which he has given the N. A. B. P. we would have 49 boards of pharmacy in the United States each functioning without regard for the other and with disorganized chaos the inevitable result.

Only a man with great patience could withstand his position as Secretary of the N. A. B. P. It often seems that no sooner does a given board of pharmacy see their duties and responsibiltiies clearly than a whole new board is appointed in that state and the process must start all over. The existence of reciprocity arrangements making it possible for pharmacists registered in one state to obtain their license in another is almost entirely the result of his untiring efforts to promote mutual respect and understanding between the states—no small task indeed!

Dr. Costello for the last three years also has had a key position in the American Council on Pharmaceutical Education and has had much to do with the Council's inspection and accreditation of colleges of pharmacy. This program has done much to upgrade pharmaceutical education in the United States, an accomplishment that is certain to have a great influence in the betterment of our profession.

Dr. Costello has held many important offices in organized pharmacy and has served as president of both the A. Ph. A. and the N. A. R. D. At the 1950 United States Pharmacopeial Convention he was elected as a member of its Board of Trustees for the 1950-60 decennium. In his earlier years he served in the U. S. Army, as

mayor of his home town, owner of a pharmacy, member of a board of pharmacy and president of his state association. It is this broad background which contributes greatly to his intimate understanding of his fellow man as well as pharmacy's current problems.

In all likelihood "Pat's" most outstanding attribute is his ability to get those with whom he works from all sections and segments of pharmacy to cooperate and work together in harmony. He has that unusual combination of forcefulness, diplomacy and tact which has brought him recognition as a leader and a host of friends.

E D I T O R I A L

A NEW ORGANIZATION IN PHARMACY?

WE recently received a press release announcing a plan to set up a new organization in pharmacy "to represent the economic, professional and scientific interests of the nation's professional or ethical pharmacists."

On the face of this announcement the uninformed would never suspect that pharmacy already suffers with too many organizations and that one more can only add to the present confusion.

Surely no one can say that the National Association of Retail Druggists fails to champion the economic interests of pharmacists! The Maguire Act alone is ample evidence of the intensive effort of the N. A. R. D. to prevent the return of retail pharmacy to those cut-throat days before fair trade. No single factor has helped the small retailer more than fair trade in his fight for economic survival.

The American Pharmaceutical Association was surely organized for the benefit of the profession and it has ardently conducted a program over the past century for the achievement of greater professional and scientific recognition for pharmacy. It is true that the A. Ph. A. should be stronger than it is but its lack of strength is due to a lack of support by pharmacists rather than a lack of program or competent leadership.

Those pharmacists who operate strictly prescription pharmacies have the American College of Apothecaries to which they may belong just as hospital pharmacists have the American Society of Hospital Pharmacists. Just what category of pharmacist is it and just which pharmacists are they who fail to find a suitable organization to represent them? Can it be that those who are responsible for this organizational effort are simply a few disgruntled fellows who have failed to have their way in the already existing organizations and now seek to secure it by this means? If so, it might be better for them to consider carefully the possible consequences of such action and whether indeed any real progress will be made in pursuing this objective.

It has been alleged that some of the organizers are discontent because they do not feel that they receive a fair share of the profits

from the distribution of prescription specialties and that their ultimate aim is to set up manufacturing facilities in competition with established concerns. This, of course, is their privilege but unless they plan to manufacture frank substitutes for popular products they will find little demand for their items without a considerable amount of time and expense in advertising and detailing them. If substitution is their aim there are already a number of unscrupulous companies ready and willing to supply them with cheap substitutes so that they can engage in this nefarious practice.

We do not wish to impugn the motives of any group of pharmacists but surely those who would attempt to start such a new organization are misguided and guilty of poor judgment to say the least. There is no need for another organization, assuming its purpose is as stated in its announced objectives. Pharmacists who are being asked to contribute to this enterprise and support it should weigh carefully the consequences of such a step and not let the enthusiasm of a few individuals influence their judgment.

The real need of Pharmacy in the United States is not more organizations but a closer cooperation of already existing associations, societies and colleges. We need to adopt sound professional and economic programs which all can support wholeheartedly without compromising our professional ideals or our economic survival. For example, there is no satisfactory excuse for the A. Ph. A. and the N. A. R. D. to be so far apart. The correction of this split in the ranks of pharmacy is of far greater importance to us all than setting up some new group to still further divide and weaken our program. It should not be necessary for the rank and file of pharmacy to sift and weigh the conflicting stories one hears concerning the merits and demerits of the two key organizations in American pharmacy. Both should be operated in such a manner that every pharmacist can be a loyal member of both without risking either ostracism or schizophrenia. Neither organization seems prepared to serve the pharmacist's complete needs, economic and professional, and thus cooperation and good will between them is absolutely essential for his welfare.

Another organization in pharmacy would indeed be placing our profession in the same predicament as the fabled "old lady who lived in a shoe." Even a child understands such a dilemma. We should be able to avoid it.

L. F. Tice

A STUDY OF PHENOLATED CALAMINE LOTION

By G. L. Stanko, and H. G. DeKay *

IN 1946 a committee of the Bulletin of the National Formulary Committee (1) conducted a survey of drugs then appearing in the N. F. This committee found that Phenolated Calamine Lotion was considered a useful drug and deserving of wider use. Since that time, the use of calamine lotion has steadily increased. With the introduction of the antihistamine drugs, calamine has been given an added popularity.

When calamine lotion was first included in The National Formulary, the powders were simply levigated until smooth and lime water was added to make the required amount of lotion. The powders would immediately begin to settle and tend to cake as the lotion aged. In the formula of N. F. VII, magma bentonite was included to retard the settling and caking. Since that time, many suspending agents have been introduced and tested on calamine lotion to delay the settling and caking of the powders (2, 3, 4, 5, 6, 7, 8).

The choice of a suspending agent will be governed by the type and use of the product formulated and the characteristics and compatibilities of the agent used. Calamine lotion is used as a drying and astringent lotion; and also as a vehicle for phenol, menthol, camphor and other externally used medicaments. A suspending agent for calamine lotion should be compatible with these medicaments.

The present official formula uses a 2% polyethylene glycol 400 monostearate [1] as the suspending agent. However, certain difficulties have arisen with this formula. When the lotion is phenolated, there is a marked loss of viscosity that makes it an unsatisfactory vehicle for phenol (9).

Kramer (10) prepared and studied Phenolated Calamine Lotion NF IX and also reported the loss of viscosity when phenol was added in the plain lotion. He was unable to separate a freshly prepared sample of phenolated lotion by centrifuging, but when the lotion stood for several days, it separated spontaneously. After stand-

* From the Research Laboratories of Purdue University, Lafayette, Indiana.

1. Carbide and Carbon Chemical Company.

ing for 18 days, a second sample was centrifuged and separated three layers—powders, clear liquid and several yellow, oily droplets. Analysis of the supernatant liquid and droplets by steam distillation and bromination showed 0.89 grams of phenol/100 cc. of lotion and 11% to 12% phenol (w/w). The volume of the droplets was estimated to be about 0.5 cc./100 cc. of lotion.

Experimental

The U. S. P. XIV and N. F. IX lotions were studied on the basis of sedimentation, particle size, viscosity and pH.

The lotions were prepared and 100 cc. samples were placed in 100 cc. cylindrical graduates. Within two weeks the plain lotion had not shown any settling, but it had become so thick that the graduate could be turned horizontally before the lotion would begin to flow. The phenolated lotion decreased very rapidly in viscosity when the phenol was added and four hours later the powders had settled 12 cc. Five days later the lotion had separated into several powder layers and a yellow, oily globule was floating on the surface.

The particle size was measured by a microscope with a calibrated scale using a magnification of 430 diameters. The particle size of the plain lotion was 3-5 microns. When measured one week later, the particle size had not changed and clumping of the powders was not apparent. Twenty-four hours after preparation, the phenolated lotion did not have such a uniform appearance. Particles were observed that ranged from 3-100 microns. The individual particles ranged from 3-5 microns, but clumps of powders were observed that ranged from 35-100 microns. This large variation was shown by the various powder layers observed in the sedimentation study. These large aggregates were partially responsible for the rapid settling of the phenolated lotion, but particle size do not seen to be a factor in the instability of the lotion.

The pH was measured with a Beckman pH Meter and all samples were thoroughly mixed before the pH readings were taken. The pH of the plain lotion remained at 7.0 after two weeks. In five days globules were observed to be floating on the surface of the phenolated lotion, but the pH remained at 7.0 before and after the appearance of the globules. No significant change in pH could be determined, and this was not considered as a contributing factor to the instability of the lotion.

Viscosity was measured with the Brookfield Viscosiometer, and the necessary spindle number was rotated at 20 rpm at a temperature of 25° C. The viscosity of the plain lotion taken immediately after preparation, was 1750-1800 cps. The viscosity seemed to rise and at the end of 15 days was 2400-2500 cps. To verify this rise of viscosity, four more samples of the plain lotion were prepared and checked for viscosity. At the end of one week all four lotions showed an increase in viscosity. The viscosity of the phenolated lotion was 10-14 cps. and remained at that reading.

The viscosity of the gel had been reported as ranging from 22.0 to 132.6 cps. (33). A sample of the gel containing 2% ester was carefully prepared, allowed to cool to 20° C. and the viscosity measured. The freshly prepared gel had a viscosity of 620-660 and spindle #2 was rotated at 20 rpm. Twenty-four hours later this gel measured 940-980 cps.

Viscosity studies do not give any indication as to the cause of the incompatibility. There is a marked drop in viscosity when the phenol is added. However, it appeared that this drop was the result of, but not necessarily the cause of the incompatibility.

The studies of sedimentation, viscosity, particle size and pH did not indicate the mechanism of the incompatibility. The explanation that had been proposed was that the phenol caused the ester to form a simple solution instead of a gel and an increase in the ester content would overcome this solution. A lotion was prepared using 4% ester and 1% liquefied phenol was pipetted into the lotion. There was a rapid decrease in viscosity, and within a week the powders had settled. When the lotion was shaken, the powders would settle overnight. This indicated that very little suspending agent remained in the lotion.

Other methods were tried to increase the solubility of the phenol in the lotion. Glycerin was substituted for the Polyethylene Glycol 400. Span 65 and tween 20 and 80 were incorporated into the lotion with 2% ester without success. The lotion containing glycerin did not show any globules, but the powders settled and would not remain in suspension.

To determine if the action of phenol on the ester was peculiar to it alone, a 1% sodium stearate gel was prepared. This gel had a consistency of a soft cream, but when 1% liquefied phenol was added, it immediately began to lose the gel appearance and in a few minutes,

was an opaque, milky liquid. This action was very similar to that observed with calamine lotion and seemed to indicate that the action of phenol was more on the gel formation rather than on the ester itself.

To observe the action of phenol on the ester, a 1% solution of liquefied phenol in the ester and a 10% solution of liquefied phenol in the Polyethylene Glycol 400 were made. After four weeks the Polyethylene Glycol 400 was unaffected by phenol. Three days after preparation, the ester solution showed a curdy precipitate and solidified.

The present formula was then abandoned as the incompatibility apparently could not be solved with the present suspending agent. Other suspending agents were then considered—sodium alginate, Methylcellulose [2] (various viscosities), Carboxymethylcellulose [3] (various viscosities), Veegum [4] regular and Veegum HV.

The stability of these materials to phenol was tested by adding 1% liquefied phenol to a 2% concentration. The Methylcelluloses immediately developed a precipitate and were discarded. The other materials did not show any change after four weeks and were considered for further study.

Phenolated Calamine lotions were prepared with these suspending agents. A 40% concentration of the following was used: 5% Veegum and Veegum HV Magma and 2% of the Carboxymethylcelluloses. Low and medium Carboxymethylcelluloses did not satisfactorily suspend the powders and were discarded. The other suspending agents were apparently satisfactory.

As some of these suspending agents were reported to form films, 2 cc. portions of the above lotions were placed on an ointment slab and allowed to dry. The lotion with high viscosity Carboxymethylcellulose formed a tough film that could be peeled from the slab. Sodium alginate formed a thin film, but could not be peeled from the slab. Veegum lotion dried and cracked without any apparent film formation. Veegum and sodium alginate were then studied further.

The Tweens [5] are widely used as wetting agents and these products were incorporated into calamine lotions to observe if any

2. Dow Chemical Company.
3. Hercules Powder Company.
4. T. R. Vanderbilt Company.
5. Atlas Powder Company.

improvement could be obtained. 1% concentrations of Tween 20, 60 and 80 were used with 10% and 15% Veegum HV Magma 5% as the suspending agent. The Tweens were found to be advantageous as they aided in readily wetting the powders; the lotion spread smoothly on the skin and was easily removed; and the cleaning of the equipment was greatly facilitated. No one particular Tween appeared to be best, so Tween 80, already official, was chosen as the wetting agent to use.

Veegum HV and regular were prepared into various magmas to determine the grade and optimum concentration. Four lotions containing 10%, 15%, 20% and 25% of a 5% Veegum HV Magma were prepared and the lotion with 20% magma was considered the best. Then 5%, 4%, and 3% magmas of each grade were prepared and water, heated to 85° C. for the 4% and 3% magmas, was used. The lotions containing 5% Veegum regular and 4% Veegum prepared with hot water were the best of this series. The magma with regular Veegum 5% was chosen as the type and concentration of Veegum Magma to use.

Lotions prepared with 2% sodium alginate as the suspending agent had several desirable characteristics, such as: smooth appearance, slow settling, slight tendency towards caking and little accumulation of the powders in the neck of the bottle. As possible film formation was an objection to this suspending agent when used alone, combinations of Veegum regular and sodium alginate were prepared. These combinations were formulated in order to retain the desirable characteristics of sodium alginate without excessive film formation.

Therefore, combinations of 2% solution of sodium alginate and 5% Veegum Magma with 1% tween 80 and 2% glycerin were prepared. 20% sodium alginate and 15% Veegum Magma, and 5% sodium alginate and 20% Veegum Magma were incorporated into lotions and passed through a hand homogenizer. These lotions appeared satisfactory, but after five days a slight separation of the powders occurred and the lotions were discarded.

Veegum Magma was then increased to 25%, Tween 80 decreased to 0.5%, but the sodium alginate remained the same. This lotion settled about 3 mm. in two days, and had a uniform appearance with very little accumulation of powders in the neck of the bottle. When applied, the lotion wet the skin readily and spread smoothly and evenly. A slight film was formed upon drying but this served

to hold the powders on the skin. This film was easily removed with water.

This lotion seemed to have the desired characteristics and was prepared in a four liter volume. The following formula was used:

Calamine	320 gm.
Zinc Oxide	320 gm.
Glycerin	80 cc.
Tween 80	20 cc.
Veegum 5% Magma	1000 cc.
Sodium Alginate 2%	200 cc.
Distilled Water—qs.	4000 cc.

Procedure: The Eppenbach Colloid Mill was used to aid in the preparation of this quantity of lotion. Place 2000 cc. of water in the mill, mix the glycerin and tween 80, dilute with an equal volume of water and add to the water in the mill. Add the powders and grind only as long as necessary to wet the powders. Mix the Veegum Magma and sodium alginate solution, add to the wetted powders and grind only as long as necessary to produce a smooth, homogenous lotion. Drain into a graduated container and add enough distilled water through the mill to make the lotion measure 4000 cc.

The use of grinding machinery greatly improved the ease of preparation and appearance of the lotion. There was a tendency for the lotion to foam, but with care during preparation, foaming will not become excessive.

To test the stability of this lotion as a vehicle to other external medicaments, the following were incorporated in the new formula: 2% resorcinol, 1% liquefied phenol, 1% thymol, 1% thymol and 0.5% menthol, 1% camphor and 0.5% menthol, and 5% benzocaine. At the end of ten days, none of these lotions showed any incompatibility or caking.

This lotion has a pH of 8.6 and a viscosity of 840-880 cps. when measured with the Brookfield Viscosiometer. Spindle #2 was used and rotated at 20 rpm. with a temperature of 25° C.

An assay for phenol content of phenolated calamine lotion was described by Martin (11). This method required steam distillation of the sample and it was necessary to collect at least 600 cc. of distillate. Bromination and titration of an aliquot portion of the dis-

tillate completed the assay. Although the method was satisfactory, a great deal of time was consumed in completing one assay. Snell (12) described a color test for phenol content of urine that indicated only free phenol. This test was rapid, simple and required reagents commonly found in the laboratory. The method was modified as follows: pipette 2 cc. of phenolated calamine lotion into a 100 ml. volumetric flask; pipette 2 cc. of calamine lotion and 2 cc. of standard solution into another 100 ml. volumetric flask; and dilute the samples to exactly 100 ml. Mix and centrifuge about a 15 cc. sample until the supernatant liquid is clear and pipette 4 cc. of each solution into test tubes. Add 4 drops of 1% $CuSO_4 \cdot 5H_2O$ solution, 4 drops of 3% hydrogen peroxide solution and 4 drops of 28% ammonia solution. Mix; allow to stand for ten minutes; add 8 drops of glacial acetic acid; and pipette 4 cc. of distiled water to each sample. Mix and examine in a Duboscq colorimeter. Three samples of phenolated calamine lotion were analyzed by steam distillation and bromination, and by the colorimetric method. Comparison of results was as follows:

	Steam Distillation	Color
Sample A	0.0086 gm./cc.	0.0085 gm./cc.
Sample B	0.0085 gm./cc.	0.0082 gm./cc.
Sample C	0.0085 gm./cc.	0.0080 gm./cc.

The standard was prepared by pipetting 10 cc. of liquefied phenol in a 1000 ml. volumetric flask and diluting to exactly 1000 ml. with distilled water. This solution was analyzed for phenol content and found to contain 0.00934 gm. phenol/cc. Four weeks later the solution was re-analyzed and found to contain 0.00935 gm. phenol/cc.

Discussion

The present U. S. P. lotion is not a satisfactory vehicle for phenol. The present explanation that phenol causes the gel to form a simple solution does not account for all of the observed results. The action of phenol is not peculiar to the ester alone, as a similar action can be obtained by using a 1% sodium stearate gel. Phenol dissolved in the glycol ester forms a curdy precipitate and clumping of the powders in the phenolated lotion into large aggregates can be observed with a microscope.

An explanation that accounts for these observations may be based on a disruption of the micelle formation by phenol. As the micelle is disrupted, there may be a change in the colloidal charge that causes the powders to clump together in large aggregates. These large aggregates settle very rapidly. When the phenol reacts with the ester, the powders are then in essentially water and settle. As yet a change in the colloidal charge has not been experimentally proven, but the observed factors are taken into account by this explanation.

As the incompatibility apparently could not be solved, other formulas for calamine lotion were prepared and tested. Methylcellulose and Carboxymethylcellulose were tested and did not prove satisfactory. Veegum and sodium alginate were stable to phenol and proved to be satisfactory suspending agents. However, the film formation of sodium alginate alone was thought to be excessive and a combination of Veegum and sodium alginate was tried and proved satisfactory. The formula recommended is as follows:

Calamine	8%
Zinc Oxide	8%
Glycerin	2%
Tween 80	0.5%
Sodium Alginate 2%	5%
Veegum Magma 5%	25%
Water qs	100%

This lotion is prepared with various external medicaments and is a satisfactory vehicle for resorcinol, thymol, camphor and menthol and benzocaine. The lotion wets the skin readily and smoothly and dries to form a slight film; but is easily removed with water.

A colorimetric test for phenol in phenolated calamine lotion that appears to be satisfactory when compared with the steam distillation method was presented. This test is rapid, simple, and uses chemicals commonly found in the laboratory. The test will require additional study, but does offer a possibility of saving a great deal of time in the assay of phenolated calamine lotion.

Summary and Conclusions

1. Calamine Lotion USP XIV has been studied and found to be an unsatisfactory vehicle for phenol.

2. Approximately thirty calamine lotions have been prepared and studied.

3. A calamine lotion has been prepared and found to be stable to phenol, resorcinol, camphor and menthol, and benzocaine.

4. A colorimetric test for the analysis of phenol in phenolated calamine lotion has been presented as a possible alternative and a rapid method of pheonl assay.

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THE EFFECT OF PERACETIC ACID ON SOME THERMOACIDURIC BACTERIA

By Louis Gershenfeld and David Everett Davis *

SPOILAGE is an important economic problem to all manufacturers of canned foods. The usual type of spoilage encountered is seen in the swollen can. Here the can is swollen due to the formation of gases during fermentation; the contents have a putrid odor. This type of spoilage is caused by a great many different organisms, which are easily destroyed by the normal processing temperatures.

Another type that is more difficult to detect is the flat sour spoilage. Here the can is not swollen, but the contents become acid and possess a characteristic flavor. This type of spoilage is more of a problem to control, as it is caused by several different kinds of thermophilic, soil spore-bearers, which are difficult to destroy.

Peracetic acid is an aliphatic peracid having the structure $CH_3CO.O.OH$. Actually it combines the active oxygen characteristics of a peroxide within the acetic acid molecule. The use of peracetic acid as a bactericide-fungicide has been reported by Greenspan (5). It is available on the market as a 40% solution and is readily soluble in water. When used, it slowly breaks down to acetic acid, hydrogen peroxide, oxygen, and water. From this it is seen that there is no toxic product remaining as a residue, all the products being freely soluble in water.

Bacilius stearothermophilus is a typical flat sour producing organism. This bacterium was originally isolated in 1917 by P. J. Donk from samples of spoiled canned corn (9). It grows at a pH near 7.0 and at temperatures from 45° C. to 76° C. (9). As the organism develops, it produces acid in the medium in which it is growing (9). This accounts for the acidity produced in the flat sour spoilage.

Another organism causing flat sour spoilage is the *Bacillus coagulans*. This organism was originally isolated in 1915 by B. W. Hammer from cans of spoiled condensed milk (10). In 1933, R. N. Berry described an organism which he isolated from cans of spoiled tomato juice of the 1931 packing season. He called this organism *Bacillus thermoacidurans* (3), a name which is characteristic, as this organism can withstand considerable heat and grows best in an acid medium (pH 5.0). Becker and Pederson (2) demonstrated that *Bacillus*

* Department of Bacteriology, Philadelphia College of Pharmacy and Science.

coagulans and *Bacillus thermoacidurans* were identical. In the Bergey classification, *Bacillus coagulans* is recognized as the name for this organism.

Tomato products have a pH range from 4.0 to 5.0. This is sufficiently acid so that many of the organisms frequently found causing spoilage in other canned foods cannot grow in tomato products. Until the isolation and subsequent studies (7) of the flat sour organisms, many tomato products were processed in a boiling water bath. However it was demonstrated (7), that such a temperature was required for 17 hours to destroy these organisms. Also the acidity of the tomato products was within the optimum pH range for this organism. Here, too, the product became more acid by the spoilage. As an example, tomato juice with a pH of 4.2 was inoculated and allowed to spoil. The final pH was found to be 3.91 and 3.93 (8).

Purpose

This investigation deals with the effects of various concentrations of peracetic acid on some of the organisms causing flat sour spoilage. It is the purpose of this study to show that the use of peracetic acid wherever legalized for cleansing purposes, in addition to the proper sanitary procedures will reduce the amount of flat sour spoilage encountered in canned foods.

Materials

Two organisms, *Bacillus stearothermophilus* (two strains) and *Bacillus coagulans* (two strains) were used.* They represent the typical flat sour producing organisms. The two strains of *Bacillus stearothermophilus* #1518 and #26, grew well on plain nutrient broth (pH 7.0). The strains #43-P and #2253 of *Bacillus coagulans* were found to be readily cultured in proteose peptone acid broth (9). Since both organisms are thermophilic, a 55° C. incubation was used in all experiments.

The peracetic acid used in these tests was obtained from the Becco Sales Corporation.** The various dilutions of the peracetic acid employed were based on the work of Greenspan (5). He especially used a 0.3% or 3,000 P.P.M. solution of peracetic acid as a wash for tomatoes in order to reduce the mold count of raw tomatoes.

* National Canners Association, 1133 20th St. N. W. Washington 6, D. C. supplied these cultures.

** Becco Sales Corporation, Buffalo 7, New York.

Methods

The general method of the tests was similar to that described in the Association of Official Agricultural Chemists (1) and Hiss (6). The actual tests were divided into two experiments as follows:

Experiment I

Actively growing cultures of each strain were maintained by transplanting every 24 hours, using the nutrient broth for the *Bacillus stearothermophilus* strains and the proteose peptone acid broth for the *Bacillus coagulans* strains. These were incubated at 55° C. On the fifth day, transplants of 0.5 ml. of the active vegetative cells of each strain was placed in seeding tubes with 5 ml. of the various dilutions of peracetic acid. The temperature was maintained at 20° C. in a water bath during the test. After the designated exposure time (see Table I) to the peracetic acid, a 4 mm. loopful of the mixture was transplanted into 10 ml. of the respective tubes of broth. The trans-

TABLE I

THE EFFECT OF VARYING DILUTIONS OF PERACETIC ACID ON SOME FLAT SOUR ORGANISMS

Strain #26 B. stearothermophilus

Min. of exposure	P.P.M. Peracetic acid 100	500	1000	2000	3000
1	+	+	+	—	—
2	+	+	—	—	—
3	+	+	—	—	—
5	+	+	—	—	—
10	+	—	—	—	—
15	—	—	—	—	—

Strain #1518 B. stearothermophilus

Min. of exposure	P.P.M. Peracetic acid 100	500	1000	2000	3000
1	+	+	+	—	—
2	+	+	+	—	—
3	+	+	+	—	—
5	+	+	—	—	—
10	+	+	—	—	—
15	+	—	—	—	—

Strain #43-P B. coagulans

Min. of exposure	P.P.M. Peracetic acid 100	500	1000	2000	3000
1	+	+	+	—	—
2	+	+	+	—	—
3	+	+	—	—	—
5	+	+	—	—	—
10	+	—	—	—	—
15	—	—	—	—	—

Strain #2253 B. coagulans

Min. of exposure	P.P.M. Peracetic acid 100	500	1000	2000	3000
1	+	+	—	—	—
2	+	+	—	—	—
3	+	—	—	—	—
5	+	—	—	—	—
10	+	—	—	—	—
15	—	—	—	—	—

\+ growth after 7 days incubation of transplants at 55° C. using vegetative cells.

— no growth.

plants were incubated at 55° C. for 7 days and examined for growth. All transplants revealing no growth were again transplanted to eliminate the possibility of a bacteriostatic action. In no instance was growth found.

Experiment II

Spores of all four strains were obtained by growing the organisms on the respective agar media and recovering the spores after 7 days incubation at 55° C. Dilutions of these suspensions were made so that there were approximately one million spores in each ml. of suspension. This concentration was determined by plating 1 ml. of a 1:10,000 dilution of each spore suspension and counting the colonies of growth after an incubation at 55° C. for 48 hours. The tests were repeated for each strain of spore suspension as given under experiment I. All transplants revealing no growth were again transplanted to eliminate the possibility of a bacteriostatic action. In no instance was growth found.

TABLE II.

THE EFFECT OF VARYING DILUTIONS OF PERACETIC ACID ON THE SPORE SUSPENSIONS OF SOME FLAT SOUR ORGANISMS.

Strain #26 B. stearothermophilus

Min. of exposure	P.P.M. Peracetic acid 100	500	1000	2000	3000
1	+	+	+	+	—
2	+	+	+	—	—
3	+	+	+	—	—
5	+	+	—	—	—
10	+	+	—	—	—
15	+	—	—	—	—

Strain #1518 B. stearothermophilus

Min. of exposure	P.P.M. Peracetic acid 100	500	1000	2000	3000
1	+	+	+	—	—
2	+	+	+	—	—
3	+	+	+	—	—
5	+	+	—	—	—
10	+	+	—	—	—
15	+	—	—	—	—

Strain #43-P B. coagulans

Min. of exposure	P.P.M. Peracetic acid 100	500	1000	2000	3000
1	+	+	+	—	—
2	+	+	+	—	—
3	+	+	+	—	—
5	+	+	—	—	—
10	+	—	—	—	—
15	+	—	—	—	—

Strain #2253 B. coagulans

Min. of exposure	P.P.M. Peracetic acid 100	500	1000	2000	3000
1	+	+	+	—	—
2	+	+	+	—	—
3	+	+	—	—	—
5	+	—	—	—	—
10	+	—	—	—	—
15	—	—	—	—	—

+ growth after 7 days incubation at 55° C. using 500,000 spores in each test.

— no growth.

Results

From the results obtained under the conditions of these tests it is apparent that different strains of the same organism display different resistances to the same concentration of peracetic acid. The spore suspensions also followed the general rule that the spore form is more resistant than the vegetative cells. Concentrations of 2,000 parts per million of peracetic acid and stronger destroyed both the vegetative and spore forms of all the strains used in a period of 2 or more minutes. A concentration of 1,000 parts per million of peracetic acid required 5 minutes. In a concentration of 500 parts per million of peracetic acid 15 minutes were required to kill the vegetative forms and spores. In weaker dilutions, the time factor would be too long for practical and economic use. In the higher concentrations there would be the advantage of a good safety margin but at an added cost.

Summary and Conculsions

The effect of various concentrations of peracetic acid was studied on several strains of *Bacillus coagulans* and of *Bacillus stearothermophilus*. Tests were employed to evaluate the effects of different concentrations of peracetic acid on the vegetative cells and spore suspensions of each strain. The results show that 500 parts per million for 15 minutes, 1,000 parts per million for five minutes, or 2,000 parts per million of peracetic acid for 2 minutes were effective against the test organisms and their spores.

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METHANOL IN WASHINGTON WINES

By Nathan A. Hall, Edward Krupski and Louis Fischer [1, 2, 3]

METHANOL is a normal constituent of wines and brandies originating to a large extent from the pectic substances present in the fruit (1-5). If the amounts found in alcoholic beverages were large, the toxicity of methanol would be a matter for concern; however the quantities usually found are so small that they are of little physiological significance (6-10).

A survey of the literature revealed that the methanol content of wines was quite variable. Bertrand and Silberstein (6, 7) have reported methanol contents from 33 to 200 mg. per liter in Italian, French and Algerian wines. Up to 0.3 g. per 100 ml. was found in mixed wines by Coltescu et al. (8) while Seifert (9) reported 7 ml. per liter. Kilbuck et al. (10) stated that a tentative tolerance of 0.35 per cent was set by the California State Food and Drug Department.

This study was designed to establish a normal range of values for the methanol content of wines currently produced in the State of Washington and to examine some of the factors which affect the methanol content in the production of one type, apple wine.

The determination of the small quantities of methanol which occur in wines is difficult because of the presence of ethanol which is closely related to methanol chemically (but not physiologically). Many methods have been proposed, but only one, the method of Denigés (11) with slight modifications, has wide acceptance as a standard procedure. Essentially the method consists of permanganic oxidation of methanol to formaldehyde, destruction of the excess permanganate and determination of formaldehyde colorimetrically by the reaction of formaldehyde with a sulfite reduced solution of fuchsin. Guymon (12) has recently extensively investigated this method which is contained in the Methods of Analysis of the Association of Official Agricultural Chemists (A.O.A.C.).

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1. College of Pharmacy, University of Washington, Seattle, Washington.

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3. The help of Mr. D. N. Montan with the analytical work is acknowledged.

The method of Egriwe (13) for the qualitative detection of formaldehyde through its reaction with chromotropic acid has been used as the basis for the U.S.P. test for methanol in ethanol. The stability of the reagent and of the color produced with formaldehyde has resulted in its use for the quantitative determination of methanol (14). Essentially the only variation from the A.O.A.C. method has been the agent used to form a color with formaldehyde. Several authors have recommended the use of chromotropic acid for the determination of methanol in alcoholic beverages (15-17). The procedure used in this work was a modification of the method proposed by Beyer (17).

Experimental

Determination of Methanol

(a) Sample Preparation: In his "Report on Methanol" Guymon (12) examined the efficiency of the distillation step described in the A.O.A.C. and found the recovery to be only about 85 per cent. Work done in this laboratory confirmed the observations of Guymon on the low recoveries by the fractionation procedure of the A.O.A.C. Satisfactory recoveries were obtained when samples were distilled directly.

(b) Alcohol Concentration. Optimum color development was found when a sample containing about 50 mg. of total alcohols was used. Greater amounts of alcohol required excessive quantities of permanganate for oxidation which could not satisfactorily be decolorized.

(c) Final volume. In the low range of concentrations of methanol which normally occur in wines, a final volume of 25 ml. was found to give optical density values which could be read more accurately than values from the 50 ml. volume recommended by Beyer (17).

(d) Procedure: A 50 ml. sample of wine was distilled in a 500 ml. Kjeldahl flask fitted with a distilling head and connected to a vertical condenser. When 40 ml. of distillate had been collected, the volume was made to 50 ml. with distilled water. Based on the total alcoholic concentration as determined by refractometer, the distillate was diluted to about one per cent alcoholic concentration.

Five ml. of the dilution was placed in a 25 ml. volumetric flask and 2.0 ml. of 3 per cent $KMnO_4$ solution containing 15 ml. of syrupy H_3PO_4 per 100 ml. was added. The flask was allowed to stand for 10 minutes, and the excess permanganate was destroyed by the addition of 0.5 ml. of freshly prepared 10 per cent sodium bisulfite. Seven-tenths ml. of 10 per cent chromotropic acid (4,5-dihydroxy-2,7-naphthalenedisulfonic acid) or its sodium salt was added, followed by 10.0 ml. of concentrated H_2SO_4 which was added in small portions with shaking after each addition. The solution was cooled, diluted to volume with water and again cooled. The optical density was read in a Beckman Model DU spectrophotometer at 570 millimicrons. A series of standards in 1 per cent ethanol was prepared containing 0.0002, 0.0005, 0.001, 0.002, 0.005 per cent methanol. Five ml. of each of the standards were treated according to the above procedure to develop the color and the optical density read. A plot of the optical density vs. the concentration of methanol in the standards gave a straight line from which the quantity of methanol in each sample could be read.

By the above method commercial samples of various wine types produced in the State of Washington were analyzed for methanol content. These results are shown in Table I.

TABLE I.

METHANOL CONTENT OF COMMERCIAL WASHINGTON WINES.

Sample No.	Type	Methanol mg. per 100 ml.	Methanol/Ethanol Ratio $\times 10^3$
1.	Port	25.0	1.3
2.	Port	26.4	1.3
3.	Port	23.6	1.2
4.	White Port	17.2	0.9
5.	White Port	17.5	0.9
6.	White Port	17.6	0.9
7.	White Port	16.4	0.8
8.	White Port	18.1	0.9
9.	Muscatel	16.9	0.8
10.	Muscatel	14.2	0.7
11.	Muscatel	18.4	0.9
12.	Tokay	20.5	1.0

Sample No.	Type	Methanol mg. per 100 ml.	Methanol/Ethanol Ratio $\times 10^3$
13.	Sherry	14.0	0.7
14.	Burgundy	18.3	1.4
15.	Sauterne	4.3	0.3
16.	Red Wine	19.0	1.5
17.	Concord	13.8	1.2
18.	Loganberry	10.2	0.9
19.	Loganberry	10.4	0.8
20.	Fruit	18.6	1.6
21.	Prune	69.9	3.5
22.	Apple	6.1	0.3
23.	Apple	15.8	0.8
24.	Apple	12.9	0.7
25.	Apple	10.4	0.5
26.	Apple	14.2	0.7
27.	Apple	15.1	0.8
28.	Apple	13.9	0.7
29.	Apple	11.4	0.6
30.	Apple	13.3	0.7
31.	Apple	8.1	0.4

The fact which is most evident from the foregoing table is that the methanol content of commercial Washington wines is not great. In no instance among the samples examined did the content of methanol reach 0.1 per cent and only in the case of prune wine did it exceed 0.05 per cent. Highly colored grape wines contained more methanol than white wines as would be expected since the skins, and hence much of the pectin, are removed before fermentation of white wines. The ten samples of apple wine were generally of lower methanol content than the grape wines.

Factors in Methanol Formation in Apple Wine

Since the major source of methanol in wines has been shown to be the methoxy groups on the pectin molecule, a study of procedures used in apple wine production which might affect the pectic substances was made to determine the effect on methanol concentration.

Fresh Apple Fermentation

Fresh Winesap apples (graded Fancy) of the 1951 crop of Washington apples were pressed. The juice was treated with sodium metabisulfite calculated to give 100 ppm. sulfur dioxide. After the sulfited juice had stood overnight, it was inoculated with an actively growing culture of *Saccharomyces ellipsoideus* champagne strain No. 211 and allowed to ferment until evolution of carbon dioxide had almost ceased. At this point the fermented juice was divided into 2 portions (A and B). Portion A represented a control, and part of it was distilled to give 188 proof apple brandy which was used to fortify the remainder to 20 per cent ethanol. This was sweetened with sucrose, filtered and bottled. Portion B was treated with 1:800 Pectinol A (supplied by Rohm and Haas Co., Philadelphia, Pa.) and allowed to stand at 25° for 16 hours. Part of the clarified juice was distilled to give 188 proof apply brandy which was used to fortify the remainder to 20 per cent ethanol, and the resulting product was finished into wine. This fermentation gave a controlled comparison between wines made with or without pectic enzyme clarification.

Pomace Fermentation

The pomace which remained after the juice had been expressed for the foregoing fermentation was suspended in water, sulfited and fermented until the evolution of carbon dioxide had ceased. The fermented liquid was all distilled to produce 188 proof brandy. This experiment gave brandy which could be compared with that produced by fermentation of the free run juice.

Decomposed Apple Fermentation

Some of the same lot of apples used in the above fermentations were bruised and allowed to decompose at room temperature. After extensive decomposition was evident, the juice was expressed and fermented as in the foregoing experiments. Part of the fermented juice was distilled to produce brandy with which the remainder was fortified to 20 per cent ethanol and finished into wine. Before the beginning of the pure culture fermentation, the must contained alcohol (6.3 per cent) which resulted from an uncontrolled wild yeast fermentation while decomposition was taking place. This experiment revealed the effect of the use of decomposed apples on the methanol content of a wine and could be compared directly to the first fermentation.

The results of the analyses made during the above fermentations are tabulated in Tables II-V.

TABLE II.

Effect of Pectinol Clarification.

	Methanol mg. per 100 ml.	Methanol/ Ethanol Ratio $\times 10^3$
Unfermented Must	0.0	0.0
Fermentation Complete	1.0	0.1
Finished Wine	2.5	0.1
Fermentation Complete (Pectinol Clarified)	4.7	0.6
Finished Wine (Pectinol Clarified)	10.7	0.5

TABLE III.

Methanol in Wine from Decomposed Apples.

	Methanol mg. per 100 ml.	Methanol/ Ethanol Ratio $\times 10^3$
Before Fermentation	27.2	4.4
Fermentation Complete	30.4	3.7
Finished Wine	70.8	3.5

TABLE IV.

Comparative Effects of Certain Factors on Methanol Content of Fortifying Apple Brandies.

	Methanol mg. per 100 ml.	Methanol/ Ethanol Ratio $\times 10^3$
Control Brandy	11.8	0.1
Brandy from Pectinol Clarified Wine	47.0	0.5
Brandy from Pomace	21.3	0.2
Brandy from Decomposed Apples	323.0	3.4

TABLE V.

COMPARATIVE EFFECTS OF CERTAIN FACTORS ON METHANOL CONTENT OF APPLE WINES.

	Methanol mg. per 100 ml.	Methanol/ Ethanol Ratio $\times 10^3$
Control Wine	2.5	0.1
Pectinol Clarified Wine	10.7	0.5
Decomposed Apple Wine	70.8	3.5

Although the methanol content of none of the apple wines made in the laboratory approached a physiologically dangerous quantity, certain factors were shown to have a profound effect upon the amount of methanol produced during the preparation of apple wine. As Kilbuck et al. (10) have pointed out for grape wines, the use of commercial pectic enzymes which contain pectase as well as pectinase resulted in an increase in methanol in the apple wine. The use of pomace to produce alcohol for fortifying brandy only slightly increased the methanol content of the brandy so produced. However, a significant increase in methanol production was apparent when decomposed or spoiled apples were used to make wine or brandy. It might be suggested that the addition of pectin decomposing enzymes to either pomace or decomposed apples would further increase the methanol content of a wine or brandy so produced as in the case of grape wine (18).

Summary

A method for determining the methanol in alcoholic beverages was modified for use in wines. Commercial wines from the state of Washington analysed by this method showed low methanol content. In only one case, that of prune wine, did the methanol content exceed 0.05 per cent.

Certain factors which affect the concentration of methyl alcohol in apple wines were examined. In controlled experiments pectinol clarification and the fermentation of pomace were found to increase methanol content, however a much larger increase was evident if decomposed apples were used to produce wine.

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PROGRAM OF PHARMACY SUBSECTION Np AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE

General Information

A.A.A.S. Meeting—Pharmacy Subsection (Np)—St. Louis, Missouri, December 29-30, 1952

Headquarters Hotel for Pharmacy—Statler.

Meeting Place: Room 3-D, Kiel Auditorium. A.A.A.S. Sections and subsections will be held in the Kiel Auditorium. Buses to and from hotels operate at frequent intervals; Auditorium is within walking distance of most hotels.

Science and Industry Exposition in Auditorium will be worth a visit by everyone.

Registration: Either in Hotel or Auditorium.

Advance Registration and Reservations: See *Science* or *Scientific Monthly* for hotel rates and reservation form.

Other Sections: Pharmacy Section members are invited to attend other sections. Preregister and plan your schedule in advance to get the most from this great meeting.

Membership: If not already a member, join the American Pharmaceutical Association and the American Association for the Advancement of Science now. Urge your associates to join also. Support the growth of the profession and science in our country.

N3—Subsection Np—Pharmacy

Secretary, The Secretary of the Subsection, Glenn L. Jenkins, School of Pharmacy, Purdue University, Lafayette, Indiana.

Program Chairman, George F. Archambault, U. S. Public Health Service, Washington, D. C.

Program of Section Np

Program Committee: George F. Archambault, U. S. Public Health Service, Washington, D. C., Chairman; Troy C. Daniels, College of Pharmacy, University of California, San Francisco, California; Glenn L. Jenkins, Purdue University School of Pharmacy, Lafayette, Indiana; Albert M. Mattocks, McNeil Laboratories, Philadelphia, Pennsylvania; and Charles Rabe, Jr., St. Louis College of Pharmacy, St. Louis, Missouri, Local Secretary.

Monday Morning, Dec. 29

9:00 A. M.; Room 3-D, Kiel Auditorium; Greetings and Messages, and session for contributed papers; Joint session of A.A.A.S. Subsection Np-Pharmacy, the American Pharmaceutical Association, Scientific Section; the American Society of Hospital Pharmacists, the American Association of Colleges of Pharmacy, and the American College of Apothecaries.

Glenn L. Jenkins, Dean, School of Pharmacy, Purdue University, Presiding

1. *Greetings and Messages:*

Charles C. Rabe, Jr., St. Louis College of Pharmacy, Local Chairman, for the American Association for the Advancement of Science.

Robert P. Fischelis, Secretary, American Pharmaceutical Association, Washington, D. C., for the American Pharmaceutical Association.

Louis C. Zopf, Dean, School of Pharmacy, University of Iowa; Secretary, American Association of Colleges of Pharmacy, for the American Association of Colleges of Pharmacy.

Grover C. Bowles, Strong Memorial Hospital, Rochester, New York, President, American Society of Hospital Pharmacists, for the American Society of Hospital Pharmacist.

James R. Thayer, St. Louis College of Pharmacy and Allied Sciences, for the St. Louis College of Pharmacy and Allied Sciences.

Sister Mary Berenice, St. Mary's Hospital, St. Louis, for the Society of Hospital Pharmacists of Greater St. Louis.

Walter G. Fredell, Lambert Pharmacal Company, President of the St. Louis Branch of the American Pharmaceutical Association, for the St. Louis Branch of the American Pharmaceutical Association. (40 min.)

2. *An Evaluation of the Rates of Release of Theophylline from Suppository Bases.* Charles F. Peterson, School of Pharmacy, University of Kansas, and Arthur J. Guida, School of Pharmacy, Medical College of the State of South Carolina, Charleston. (Lantern, 15 min.)

3. *The Effect of Banthine and Prantal in Human Thermoregulatory Sweating.* Morton J. Rodman, School of Pharmacy, Rutgers University. (15 min.)

4. *The Synthesis of Fluorobromo Derivatives of Benzoic Acid as Possible Radiographic Opaques.* Glenn L. Jenkins, Gustav E. Cwalina, and Charles H. Sprague, School of Pharmacy, Purdue University. (Blackboard, 20 min.)

5. *The Solubility Phenobarbital in Alcohol-propylene Glycol-water Mixtures.* Charles F. Peterson and Raymond E. Hopponen, School of Pharmacy, University of Kansas, Kansas. (Lantern, 10 min.)

Monday Afternoon, Dec. 29

1:45 P. M.; Room 3-D, Kiel Auditorium; Session for contributed papers; Joint session of A.A.A.S. Subsection Np-Pharmacy, the American Pharmaceutical Association, Scientific Section, the American Society of Hospital Pharmacists, the American Association of Colleges of Pharmacy, and the American College of Apothecaries.

George F. Archambault, U. S. Public Health Service, Presiding.

1. *Experiences with a New Method of Producing Distilled Water for the Hospital Pharmacy.* Mary A. Lane, Thomas A. Manzelli, and Herbert L. Flack, Jefferson Medical College Hospital, Philadelphia College of Pharmacy and Science. (20 min.)

2. *The Anti-fungal Activity of an Extract of Osage Orange Wood.* Charles F. Peterson and Eugene W. Brockemeyer, School of Pharmacy, University of Kansas. (Lantern, 10 min.)

2:15 P. M.; Room 3-D, Kiel Auditorium; Symposium: The Accreditation of Hospital Pharmacies and the Approval of Pharmacy Intern and Residency Programs, the Parts to be Played by the Joint Commission on Accreditation of Hospitals, the Schools, the Associations, and the Hospitals Themselves; Joint session of A.A.A.S. Subsection Np-Pharmacy, the American Pharmaceutical Association, Scientific Section, the American Society of Hospital Pharmacists, the American Association of Colleges of Pharmacy, and the American College of Apothecaries.

Don E. Francke, University of Michigan Hospital, Pharmacy, Editor, Bulletin of the American Society of Hospital Pharmacists, Presiding.

Speakers:

Martha Johnson, Assistant to the Director, Joint Commission on Accreditation of Hospitals.

James R. Shaw, Chief, Division of Hospitals, U. S. Public Health Service.

Robert P. Fischelis, Secretary, American Pharmaceutical Association, Washington, D. C.

Ray Kneifl, Executive Secretary, Catholic Hospital Association of the United States and Canada, St. Louis.

Louis C. Zopf, Dean, College of Pharmacy, State University of Iowa, Secretary, American Association of Colleges of Pharmacy.

Grover C. Bowles, Strong Memorial Hospital, Rochester, New York, President, American Society of Hospital Pharmacists.

Donald C. Brodie, University of California, School of Pharmacy.

Tuesday Morning, Dec. 30

9:00 A. M.; Room 3-D, Kiel Auditorium; Session for contributed papers; Joint session of A.A.A.S. Subsection Np-Pharmacy, the American Pharmaceutical Association, Scientific Section, the American Society of Hospital Pharmacists, the American Association of Colleges of Pharmacy, and the American College of Apothecaries.

Allen V. R. Beck, Chief, Pharmacy Department, Indiana University Medical Center Hospital, Indianapolis, Presiding.

1. *The Use of Isopropanol in Ice Bags.* Margaret Trevis and Evlyn G. Scott, St. Luke's Hospital, Cleveland, Ohio.
2. *How many Sterile Gauze Sponges are needed Adequately to Protect a Clean Wound?* Sister Mary John, Mercy Hospital, Toledo, Ohio. (Lantern, 20 min.)
3. *Suggested Content of Pharmacists' Public Relations Brochure.* C. Lee Huyck, St. Louis College of Pharmacy and Science.
4. *Some Important Points in the History of Education and Legislation in a Century of American Pharmacy.* C. Lee Huyck, St. Louis College of Pharmacy and Allied Science.

10:15 A. M.; Room 3-D, Kiel Auditorium; Symposium: The Content of Hospital Pharmacy Courses in Schools of Pharmacy; Joint session of A.A.A.S. Subsection Xp-Pharmacy, the American Pharmaceutical Association, Scientific Section, the American Society of Hospital Pharmacists, the American Association of Colleges of Pharmacy, and the American College of Apothecaries.

Grover Bowles, Chairman, Strong Memorial Hospital, Rochester, New York, Presiding.

Speakers:

Sister Mary Berenice, St. Mary's Hospital, St. Louis, Missouri.

Allen V. R. Beck, Indiana University Medical Center Pharmacy.

Ray Kneifl, Executive Secretary, Catholic Hospital Association of the United States and Canada, St. Louis.

Glenn L. Jenkins, Dean, School of Pharmacy, Purdue University.

Louis C. Zopf, Dean, College of Pharmacy, State University of Iowa.

W. Arthur Purdum, Johns Hopkins Hospital Pharmacy.

Don E. Francke, University of Michigan Hospital Pharmacy.

Donald L. Brodie, Supervisor of Hospital Pharmacy Education, School of Pharmacy, University of California.

Tuesday Afternoon, Dec. 30

1:45 P. M.; Room 3-D, Kiel Auditorium; Session for contributed papers; Joint session of A.A.A.S. Subsection Xp-Pharmacy, the American Pharmaceutical Association, Scientific Section, the American Society of Hospital Pharmacists, the American Association of Colleges of Pharmacy, and the American College of Apothecaries.

Charles C. Rabe, Jr., St. Louis College of Pharmacy and Allied Science. Presiding.

1. *Investigations on Hectorite.* Martin Barr and Ivor Griffith, Philadelphia College of Pharmacy and Science.

2. *An Evaluation of Some Bacteriostatic Agents in Multiple Dose Parenterals.* Paul E. Zimpfer, Professor of Biology, Capital University, and Cristopher H. Costello, Scientific Director, Columbus Pharmacal Company, Columbus, Ohio. (Lantern, 15 min.)

3. *An Investigation of the Iodine Compounds Present in Milk Following Iodocasein and Iodide Administration.* Walter E. Wright, John E. Christian, and Fred N. Andrews, Purdue University School of Pharmacy.

2:30 P. M.; Room 3-D, Kiel Auditorium; Symposium: The Role of the U.S.P., the N.F. the N.N.R., and the A.D.R. in Developing and Maintaining Sound Drug Therapy Trends and Standards; Joint session of A.A.A.S. Subsection Np-Pharmacy, the American Pharmaceutical Association, Scientific Section, the American Society of Hospital Pharmacists, the American Association of Colleges of Pharmacy, and the American College of Apothecaries.

Linwood F. Tice, Dean, Philadelphia College of Pharmacy and Science, Presiding.

Speakers:

Lloyd C. Miller, Director of Revision, U. S. Pharmacopeia, New York City.

Justin L. Powers, Chairman, Committee on the National Formulary, Washington, D. C.

Louis C. Zopf, Dean, School of Pharmacy, State University of Iowa.

Robert T. Stormont, Secretary, Council on Pharmacy and Chemistry of the American Medical Association, Chicago.

J. Roy Doty, Secretary, Council on Dental Therapeutics of the American Dental Association, Chicago.

SELECTED ABSTRACTS

New Local Therapy of Burns. Choy, D. S. J., and Wendt, W. E. *U. S. A. F. Med. J. 3*:1241 (1952). A plastic dressing to be sprayed on the burned area from an aerosol bomb was studied for its effect on experimental burns on hogs. The plastic selected was a modified polyvinyl chloride acetate copolymer dissolved in ethyl acetate.

Preliminary studies included tests for permeability to bacteria and bacteriostatic properties and gross qualitative tests for adhesiveness to the skin, elasticity, water resistance, flexibility, and permeability to water vapor. It was found that when a film of the plastic was sprayed on agar plates seeded with different organisms that a moderate bacteriostatic effect was evident. A film 2 to 3 mm. thick was found to be impermeable to motile coliform organisms. The unburned digits and hands of several subjects were coated with the plastic and then they were instructed to go about their usual activities. After 24 hours the "gloves" were found to be adherent, except at the edges; sufficiently flexible to permit bending without cracking; waterproof; and sufficiently permeable to water vapor to prevent the formation of "water blisters" from trapped perspiration. The plastic was easily peeled off showing a skin which was not puckered or wrinkled.

Patch tests were performed on 1,052 human subjects. Only 0.29 per cent showed erythema after 48 hours. Third degree burns involving 20 per cent of the body surface was administered to 18 hogs, 4 of which were controls. The plastic was then sprayed on the burned area. The animals were sacrificed at the end of the experiment and carefully studied. The evidence suggested that there was no systemic toxic effect from the plastic. However, the authors emphasized that much more experimental study is necessary.

A number of advantages of a local therapy of this type for burns were given by the authors, including, less time required for application by relatively untrained personnel, applicabiliity to parts of body poorly adapted to pressure dressings, transparency allowing frequent inspection without removal of the dressing, reduction of local loss of electrolytes, absence of tourniquet effect on limbs, adaptability to mass treatment and moderate bacteriostasis.

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